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The Effects of Consistent Exercise on Work Productivity Among Anesthesia Providers

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THE EFFECTS OF CONSISTENT EXERCISE ON WORK PRODUCTIVITY AMONG ANESTHESIA PROVIDERS

by

Samuel Keller Self

Abstract of a Capstone Project
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Nursing Practice

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ABSTRACT

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Studies have been done that link various measurements of workplace productivity with varying levels of individual health. A thorough literature review examined the research to find any significant relation between regular exercise (as defined by the American Heart Association) and an improvement in workplace productivity among anesthesia providers. A Qualtrics survey was used to measure specific results regarding exercise activity and work productivity from anesthesia providers. This group included 53 certified registered nurse anesthetists and anesthesiologists. Descriptive analysis, Chi-square test of Independence, Fisher's Exact test, and Cramer's V test were all used to analyze the data. One significant correlation was present from the survey questions. Using the Cramer's V to compare questions 8 and 11, the correlation coefficients whose magnitude are between 0.3 and 0.5 ($r=.359$, $p=.049$) indicate variables that have a low correlation, but it is still meaningful due to the significance level. Therefore, we can interpret that the number of people who "call-in-sick" is significantly lower in the exercise group, than the group that does not exercise. Although only one question revealed statistical significance, there are many possibilities for future research and many implications for future practice.

Further testing is needed to gain a more detailed perspective of the clinical question. This project will be published through The University of Southern Mississippi and the Mississippi Association of Nurse Anesthetists.

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by

Samuel Keller Self

A Capstone Project
Submitted to the Graduate School
and the Department of Advanced Practice
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Nursing Practice

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December 2015

DEDICATION

As I have journeyed through the process of earning this doctoral degree my beloved wife, my adventurous son, my family, and my friends have provided the support I needed to complete this lifelong goal. Thank you for your love and patience.

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Special thanks go to my committee chair, Dr. Vickie Stuart, and my other committee members, Dr. Michong Rayborn, and Dr. John Bailey, for their advice and support throughout the duration of this project. I would also like to thank Sun Gu Park, Biostatistics Data Analyst, for lending his professional assistance to the statistical analysis of this project.

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LIST OF ABBREVIATIONS

CRNA	Certified Registered Nurse Anesthetist
AHA	American Heart Association
ACSM	American College of Sports Medicine
SCT	Social Cognitive Theory

CHAPTER I

INTRODUCTION

An increasing number of cases, high pressure for fast turnover times, and higher acuity of patients all lead to the practice of anesthesia being a high-stress job (Chipas & McKenna, 2011). Physical factors such as diabetes, hypertension, and obesity can increase work-related stress and decrease productivity (Berenson, 2012). According to a study done by Mills, Kessler, Cooper, and Sullivan in 2007, exercise can be an effective way to increase workplace productivity. This capstone will examine the relationship between consistent exercise and workplace productivity in anesthesia providers.

The clinical problem of interest is noted in this PICO question: P (Patient problem or population) – certified registered nurse anesthetists and anesthesiologists who provide anesthesia, I (Intervention) – engage in physical activity as defined by the American Heart Association, C (Comparison) – non-active anesthesia providers, O (Outcome) – more productive in the workplace.

Workplace productivity can be directly traced to amount of exercise, overall health, and the total number of days present on the job (Mitchell & Bates, 2011). In contrast, not taking vacation days and long periods of work without a break can decrease long-term productivity (Schultz & Edington, 2007). In this project, comprehensive surveys were sent to anesthesia providers in the Southeastern area of the United States. 53 surveys were completed in Qualtrics. The survey includes questions on amount and type of exercise, amount of planned medical-leave days used, amount of vacation days used, annual cases

done, average hours per day worked, number of annual call-ins, and amount of routine exercise completed. The results were analyzed and compared based on survey results. Participants were grouped in categories based on their exercise level, as defined by the American Heart Association.

The American Heart Association currently recommends at least 30 minutes of moderate-intensity aerobic activity at least 5 days per week for a total of 150 OR at least 25 minutes of vigorous aerobic activity at least 3 days per week for a total of 75 minutes; or a combination of moderate- and vigorous-intensity aerobic activity AND moderate- to high-intensity muscle-strengthening activity at least 2 days per week for additional health benefits. For lowering blood pressure and cholesterol an average 40 minutes of moderate- to vigorous-intensity aerobic activity 3 or 4 times per week (Haskell et al., 2007).

The facts uncovered in this project can be used to motivate anesthesia providers to adopt a healthier lifestyle, beneficial to the individual, and the patients that are cared for each day. The goal for this capstone project is to provide usable information to anesthesia departments and hospital administrators about the positive benefits of maintaining a regular exercise plan. This could be used to provide incentives for individual anesthesia providers and whole anesthesia departments. Incentivizing routine exercise may increase compliance with a scheduled plan. Also, the results may show a direct way to increase productivity in the surgical department.

Review of Literature

Included in this section is a narrative review of literature that focuses on work productivity and exercise. Searches of electronic databases were done from January 2014 to May 2015, with January1, 2000 used as the starting date limitation. EBSCOhost, Academic Search Premier, MEDLINE, and CINAHL were all searched using “exercise,” “obesity,” “productivity,” “workplace productivity,” and “American exercise guidelines” as a keyword, title word, abstract word, full text word, or subject heading. A total of 13 articles were selected for use in this review.

In 2007, Schultz and Edington conducted a review that examined literature to explore the link between employee health and on-the-job productivity, also known as presenteeism. Searches of Medline, CINAHL and PubMed were conducted in October 2006, with no starting date limitation with "presenteeism" or "work limitations" as keywords. A total of 113 studies were found using this method. Each study was evaluated based on the strength of the study design, statistical analyses, outcome measurement, and controlling of confounding variables. Literature showed that presenteeism is linked with a large number of health risks and health conditions ranging from exercise and weight to allergies and irritable bowel syndrome (Schultz & Edington, 2007). Based on the research reviewed here, it can be said with confidence that health conditions such as allergies and arthritis are associated with presenteeism. Moreover, health risks traditionally measured by a health risk appraisal, especially physical activity and body weight, also show an association with presenteeism.

Also in 2007, Mills and colleagues conducted research that evaluates the impact of a multi-component workplace health promotion program on employee health risks and work productivity. A quasi-experimental, 12-month before-after intervention-control study was used as the design. Of 618 employees offered the program, 266 (43%) completed questionnaires before and after the program. Out of 2500 in the control population, 1242 (49.7%) also completed questionnaires 12 months apart. Outcomes included a cumulative count of health risk factors, and the World Health Organization performance questionnaire that measures workplace absenteeism, and work performance. After adjusting for baseline differences, improvements in all three outcomes were significantly greater in the intervention group compared with the control group (Mills et al., 2007). The results suggest that a well-implemented multi-component workplace health promotion program can produce sizeable changes in health risks and productivity.

Mitchell and Bates studied health-related productivity loss in 2011. The objective of their study was to determine the relationship between health status and productivity loss and to provide estimates of the business implications of lost work performance. Health risk appraisal responses from over 1 million participants were analyzed to determine productivity loss associated with several common health conditions and health risks. Propensity scores and a matching technique were used to create analysis groups that differed only by presence of a particular health condition or risk. Results were monetized and multiplied by the average number of employees with conditions or risks to illustrate the potential

impact of productivity loss to employers. Costs of productivity loss were compared to medical costs for the same conditions and health risks. The final results support the premise that lifestyle risk factors and health conditions are directly associated with workplace productivity loss.

Musich, Hook, Baaner, Spooner, and Edington investigated the impact of selected corporate environment factors, health risks, and medical conditions on job performance using a self-reported measure of presenteeism. This was done in Australia in 2006. A cross-sectional survey utilizing health risk appraisal (HRA) linked presenteeism with corporate environment factors, health risks, and medical conditions were used as the design. Approximately 8,000 employees across ten diverse Australian corporations were included. Employees (N 51523; participation rate, 19%) who completed an HRA questionnaire were used as the subjects. Self-reported HRA data were used to test associations of defined adverse corporate environment factors with presenteeism. Increased presenteeism was significantly associated with poor working conditions, ineffective management/leadership, and work/life imbalance (adjusting for age, gender, health risks, and medical conditions). Although the study has some limitations, including a possible response bias caused by the relatively low participation rate across the corporations, the study does demonstrate significant associations between corporate environment factors, health risks, and medical conditions and self-reported presenteeism (Musich et al., 2006).

The study provides initial evidence that health management programming may benefit on-the-job productivity outcomes if expanded to include interventions targeting work environments.

In 2006, Musich and colleagues led the research on another Australian study linking medical conditions and workplace productivity. The overall purpose of this research was to investigate the impact of health on job performance using two measures of productivity loss: (1) a self-reported measure of health-related presenteeism and (2) an objective measure of absenteeism. A cross-sectional survey using a Health Risk Appraisal (HRA) to evaluate self-reported presenteeism and the prevalence of 12 health risks and eight medical conditions was used. Employees (n = 224) of a private insurance provider in Australia were used as subjects. A Health Risk Appraisal (HRA) questionnaire was used to evaluate self-reported presenteeism on different aspects of job demands and to assess the prevalence of 12 health risks and eight medical conditions. Illness-absent hours were obtained from company administrative records. Increased presenteeism was significantly associated with high stress, life dissatisfaction, and back pain, while increased illness absenteeism was significantly associated with overweight, poor perception of health, and diabetes. Excess presenteeism associated with excess health risks (productivity loss among those with medium- or high-risk status compared to those with low-risk status) was independently calculated at 19.0% for presenteeism and 12.8% for illness absenteeism. This study demonstrates an association between health metrics and self-reported work impairment (presenteeism) and measured absenteeism (Musich et al.,

2006). The study provides an indication of the potential benefits of health promotion programming for improving health of Australian employees. It also shows the benefits of the corporation in minimizing health-related productivity loss.

Chipas and McKenna presented a study in 2011 to determine the current level of stress and its physical manifestations in Certified Registered Nurse Anesthetists (CRNAs) and student registered nurse anesthetists. It also looked at coping mechanisms individuals commonly employ to combat the effects of stress. The study used data collected between February and May 2008 using a Stress and Burnout Survey on an online survey tool (SurveyMonkey). A link was distributed in 2 electronic requests to approximately 28,000 nurse anesthesia providers. The response rate was 26.9% (N = 7,537). Based on responses and comments, recommendations can be made for future wellness interventions for the Association and for individuals. It is shown that CRNAs work in high-stress environments and have a wide number of coping mechanisms to handle it.

On a national scale, Harris et al. reviewed the results of the U.S. Centers for Disease Control and Prevention's analysis of 2011 Behavioral Risk Factor Surveillance System survey data to assess participation in aerobic physical and muscle-strengthening activities among adults. The prevalence of adults meeting the 2008 Physical Activity Guidelines for Americans is provided. Based on 2011 BRFSS data, approximately one in five U.S. adults report engaging in enough of both aerobic and muscle- strengthening activities to meet the 2008 guidelines. Among all 50 states and the District of Columbia, the prevalence of meeting both

aerobic and muscle-strengthening guidelines ranged from 12.7% to 27.3%. Nationwide, 51.6% of U.S. adults met the aerobic activity guideline, and 29.3% met the muscle- strengthening guideline. Within their comparative groups, lower proportions of women, Hispanics, older adults, and obese persons met the aerobic and muscle-strengthening guidelines.

Low, Gramlich, and Engram (2007) researched the impact of a self-paced exercise program on productivity and health outcomes of 32 adult workers in a large federal office complex during a 3-month span. Walking was the sole form of exercise. The first month, during which no walking occurred, was the control period. The second and third months were the experimental period. Participants were divided into three levels based on initial weight and self-determined walking distance goals. Productivity (using the Endicott Work Productivity Scale), walking distance (using a pedometer), and health outcomes (blood pressure, weight, pulse rate, and body fat percentage) were measured weekly. Results from this study, based on a paired t test analysis, suggest that although the self-paced exercise program had no impact on productivity, it lowered blood pressure and promoted weight loss. Further study using a larger sample and a controlled experimental design is recommended to provide conclusive evidence.

In 2011, von Thiele Schwarz and Hasson investigated how worksite health interventions, involving a 2.5-hour reduction of weekly working hours with or without mandatory physical exercise, affects productivity. Six workplaces in dental health care were matched and randomized to three conditions. Employees' (N = 177) self-rated productivity and the workplaces' production

levels (number of patients) were examined longitudinally. Number of treated patients increased in all conditions during the intervention year. While reduction of working hours showed the largest increase in this measure, physical exercise showed significant increases in self-rated productivity, that is, increased quantity of work and work-ability and decreased sickness absence. A reduction in work hours may be used for health promotion activities with sustained or improved production levels. This suggests that the same or higher production level can be achieved with lesser resources (von Thiele Schwarz & Hasson, 2011).

CHAPTER III

METHODOLOGY

After given approval by the Institutional Review Board (IRB) at The University of Southern Mississippi, an 11-question survey was developed with the online survey tool Qualtrics through The University of Southern Mississippi. Convenience sampling was used, and individual e-mail addresses were provided to the researcher by anesthesia providers (CRNA and anesthesiologist). Also, the Mississippi Association of Nurse Anesthetists sent a blast e-mail out to all of its more than 500 members. The survey link was sent by e-mail on September 15, 2015. The survey closed at 2:00pm on September 20, 2015. Each respondent will remain anonymous as there will be no sensitive information given by each individual who completes the survey. All answers will be self-reported by each participant. Each person gave informed consent by answering the survey questions.

Inclusion criteria are limited to anesthesia providers (CRNA or anesthesiologist) who provide anesthesia care for patients an average of 40 hours per week. Participants must be between 18 and 70 years of age. All others will be excluded from participating.

The goal sample size was from 30-50. Convenience sampling was used. This sampling is an additional benefit because subjects are conveniently chosen due to their ease of accessibility at the stated setting. Survey questions included annual number of cases completed, annual number of call-ins, annual number of vacation days used, annual number of planned medical leave days used, and

amount of exercise routinely completed. All of these measurements can be accepted regarding applicability, practicality, comprehensiveness, reliability, validity, and responsiveness.

Conceptual and Theoretical Framework

Health behavior theory best aligns with this capstone project. The project will strictly be focused on the behavior of anesthesia providers, and how those behaviors translate into workplace productivity. More specifically, Social Cognitive Theory (SCT) closely fits what is being measured. Bandura, who explains that human behavior revolves around three things, has best articulated the SCT which includes personal factors, environmental influences, and behavior (Bandura, 2001). Ultimately, it will be up to each individual anesthesia provider to adopt a lifestyle of health and wellness. This directly relates to the personal factors, environmental influences, and behavior that Bandura extensively discusses (Butts & Rich, 2011). Bandura's emphasis on self-efficacy (Bandura, 2001) shows that health behavior cannot be forced on individuals.

The SCT has a special niche in healthcare today. There seems to be a trend of increased personal responsibility when it comes to making decisions regarding a person's health. Information is becoming easier to access, and this offers common people the opportunity to educate themselves on basic health choices. Observational learning, self-control, reinforcement, and self-efficacy are all key constructs of this theory (Butts & Rich, 2011). These key points highlight the strength of the SCT in a healthcare environment that is ever changing.

The future is unknown, but implementing the SCT into our healthcare framework can have increased benefits as we continue to depend more on individual decision-making regarding health and wellness.

Setting

The setting for this project is the Southeastern United States, although there is no strict limitation on geographical borders. The defining limits are a participant must be either a CRNA or an anesthesiologist. Surveys will be e-mailed to participants, and they will be able to complete at their convenience. Each participant must have internet and e-mail access to complete the survey, which allows for a broad setting.

Barriers

Barriers for this project include inaccuracy of self-reported data, small sample size from a limited number of participants, and over-estimation of exercise quality and amount among anesthesia providers. While the American Heart Association exercise guidelines are straightforward, some participants may interpret their levels of exercise differently. Different work environments among anesthesia providers are could be a barrier to several questions used in the survey. Each work environment has different types of scheduling, patient acuity, total case numbers, turnover times, and management that can alter the responses to survey questions.

Population

The inclusion criteria of survey participants will be anesthesia providers (CRNA or anesthesiologist) in the United States that practiced an average of 40 hours per week over the previous year. These anesthesia providers may practice in any setting, including, but not limited to a hospital, surgery center, dentist office, endoscopy center, pediatric hospital, or labor and delivery center. Providers may take calls during weekends and nights, or work a standard schedule each week. Participants can work in any practice setting including ACT model, independent or solo practice, military, or medical direction. Exclusion criteria include anyone less than 18 or older than 70 years of age. All participants must have a current license to practice anesthesia.

CHAPTER IV

ANALYSIS OF DATA

There are multiple hypotheses in this research project that examine a possible relationship between consistent exercise and work productivity. Overall, the null hypothesis states that consistent exercise does not have a positive correlation with work productivity. Exercise guidelines from the American Heart Association will be followed to divide groups. Each survey question will be compared to the exercise groups (Question 11) to determine any level of significance. Since each question was individually compared to Question 11 (exercise group), each question is also stated as a hypothesis. Descriptive analysis, Chi-square test of Independence, Fisher's Exact test, and Cramer's V test were all used to measure the results of the survey questions. Microsoft Excel and SPSS version 20 were used to compile and analyze the data.

With chi-square and Cramer's V, the observed frequencies in the cells of a contingency table were compared with what would be expected to see if the two variables are independent. Chi-square is a measure of statistical significance. It answers the question, "Is there a relationship between our dependent variable and our independent variable?" Cramer's V is a measure of substantive significance. It answers the question, "How strong does the relationship appear to be?"

Correlation coefficients whose magnitude is between 0.9 and 1.0 indicate variables, which can be considered *very highly correlated*. Correlation coefficients with magnitude between 0.7 and 0.9 indicate variables, which can be

*considered highly correlated***.** Correlation coefficients whose magnitude is between 0.5 and 0.7 indicate variables, which can be considered *moderately correlated*. Correlation coefficients whose magnitude is between 0.3 and 0.5 indicate variables which have a *low correlation*. Correlation coefficients whose magnitude is less than 0.3 have *little or no correlation*. The level of significance will be assessed at 95% or 0.05 for research significance in accordance with contemporary scientific standards.

The Chi-square test is appropriate for larger sets of data. When sample sizes are small, as indicated by more than 20% of the contingency cells having expected values <5 a Fisher's exact test maybe more appropriate. The Pearson correlation coefficient test is for comparing between the interval or ratio variable versus interval or ratio variable. However, in this case, the nominal variables are present, therefore, it would better to use Cramer's V test than the Pearson's test.

Multilevel analysis will be used to track the data that is found during this project. It will serve this project best by keeping each measurement separate. It will then be easier to see any flaws in a specific measurement, or if measurements have lower significance when explaining improved workplace performance of an anesthesia provider. The following is a breakdown of each individual survey question when compared to the exercise habits of each participant.

Question 4

The null hypothesis states that consistent exercise does not have a positive correlation with the sex of the participant. A chi-square test indicated *no*

significant correlation between question 11 and question 4. Moreover, there were too many cells which have an expected count less than 5; therefore, Fisher's Exact Test should be used in this case. However, the result (p >.05) of the test still shows that there was *no significant* correlation. Due to every variable being nominal data in the dataset, Cramer's V test should be used. From the Cramer's V, the correlation coefficients whose magnitude are less than 0.3 (r=.204, p=.789) have *little or no correlation*. This leads to a retention of the null hypothesis.

Table 1

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1.962[a]	4	.743	.789		
Likelihood Ratio	2.118	4	.714	.769		
Fisher's Exact Test	1.970			.789		
Linear-by-Linear Association	.004[b]	1	.947	1.000	.514	.077
N of Valid Cases	47					

7 cells (70.0%) have expected count less than 5. The minimum expected count is 2.30. The standardized statistic is .067.

Table 2

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.204			.743	.789
	Cramer's V	.204			.743	.789
Interval by Interval	Pearson's R	.010	.149	.066	.948[c]	1.000
Ordinal by Ordinal	Spearman Correlation	.025	.151	.169	.867[c]	.871
N of Valid Cases		47				

Not assuming the null hypothesis. Using the asymptotic standard error assuming the null hypothesis. Based on normal approximation.

Question 5

The null hypothesis states that consistent exercise does not have a positive correlation with “taking call.” A chi-square test indicated *no significant* correlation between question 11 and question 5. Moreover, there were too many cells that have an expected count less than 5; therefore, Fisher’s Exact Test must be used in this case. However, the result (p >.05) of the test still shows that there was *no significant* correlation. Due to every variable being nominal data in the data set, Cramer’s V test is used.

From the Cramer's V, the correlation coefficients whose magnitude is between 0.3 and 0.5 (r=.368, p=.182) indicate variables that have a *low correlation*. This leads to retention of the null hypothesis.

Table 3

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6.239[a]	4	.182	.191		
Likelihood Ratio	7.726	4	.102	.159		
Fisher's Exact Test	5.506			.225		
Linear-by-Linear Association	1.960[b]	1	.162	.182	.099	.035
N of Valid Cases	46					

7 cells (70.0%) have expected count less than 5. The minimum expected count is 1.57. The standardized statistic is 1.400.

Table 4

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.368			.182	.191
	Cramer's V	.368			.182	.191
Interval by Interval	Pearson's R	.209	.145	1.415	.164[c]	.182
Ordinal by Ordinal	Spearman Correlation	.240	.149	1.643	.108[c]	.112
N of Valid Cases		46				

Not assuming the null hypothesis. Using the asymptotic standard error assuming the null hypothesis. Based on normal approximation.

Question 6

The null hypothesis states that consistent exercise does not have a positive correlation with average hours worked in a day. A chi-square test indicated *no significant* correlation between question 11 and question 6. Moreover, there were too many cells that have an expected count less than 5; therefore, Fisher's Exact Test must be used in this case. However, the result (p >.05) of the test still shows that there was *no significant* correlation. Due to every variable being nominal data in the data set, Cramer's V test should be used.

From the Cramer's V, the correlation coefficients whose magnitude are between 0.3 and 0.5 (r=.375, p=.343) indicate variables that have a *low correlation*. This leads to retention of the null hypothesis.

Table 5

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	21.960[a]	20	.343	.350		
Likelihood Ratio	22.971	20	.290	.363		
Fisher's Exact Test	19.940			.306		
Linear-by-Linear Association	1.185[b]	1	.276	.299	.153	.021
N of Valid Cases	39					

29 cells (96.7%) have expected count less than 5. The minimum expected count is .13. The standardized statistic is -1.089.

Table 6

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.750			.343	.350
	Cramer's V	.375			.343	.350
Interval by Interval	Pearson's R	-.177	.164	-1.091	.282[c]	.299
Ordinal by Ordinal	Spearman Correlation	-.161	.174	-.992	.327[c]	.326
N of Valid Cases		39				

Not assuming the null hypothesis. Using the asymptotic standard error assuming the null hypothesis. Based on normal approximation.

Question 7

The null hypothesis states that consistent exercise does not have a positive correlation with annual number of cases. A chi-square test indicated *no significant* correlation between question 11 and question 7. Moreover, there were too many cells that have an expected count less than 5; therefore, Fisher's Exact Test must be used in this case. However, the result (p >.05) of the test shows that there was still *no significant* correlation. Due to all variables being nominal data in the data set, Cramer's V test should be used. From the Cramer's V, the correlation coefficients whose magnitude are less than 0.3 (r=.263, p=.707) have *little or no correlation***.**

The original result has too many cells (100%) that have an expected count less than 5. Therefore, a new category with 4 groups (the original one had 8 groups) was created, and the data was analyzed again. After re-grouping, the overall results for this question remained the same, however, the Exact Sig. number is quite smaller than the original result. This leads to retention of the null hypothesis. (0-399.9 = group 1, 400-799.9 = group 2, 800-1199.9 = group 3, More than 1200 = group 4)

Table 7

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	8.953[a]	12	.707	.755		
Likelihood Ratio	9.348	12	.673	.850		
Fisher's Exact Test	7.092			.909		
Linear-by-Linear Association	.203[b]	1	.653	.664	.348	.039
N of Valid Cases	43					

18 cells (90.0%) have expected count less than 5. The minimum expected count is .58. The standardized statistic is -.450.

Table 8

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.456			.707	.755
	Cramer's V	.263			.707	.755
Interval by Interval	Pearson's R	-.069	.152	-.446	.658[c]	.664
Ordinal by Ordinal	Spearman Correlation	-.046	.155	-.294	.770[c]	.769
N of Valid Cases		43				

Not assuming the null hypothesis. Using the asymptotic standard error assuming the null hypothesis. Based on normal approximation.

Question 8

The null hypothesis states that consistent exercise does not have a positive correlation with the number of times a provider “called in sick.” A chi-square test indicated a *significant* correlation between question 11 and question 8. However, there were too many cells which have an expected count less than 5, therefore, Fisher’s Exact Test must be used in this case. According to the table, the result ($p < .05$) of the test shows that there was a *significant* correlation. Due to every variable being nominal data in the data set, Cramer’s V test should be used. From the Cramer’s V, the correlation coefficients whose magnitude are between 0.3 and 0.5 ($r = .359$, $p = .049$) indicate variables which *have a low*

correlation, but it still meaningful due to the significance level. Therefore, this can be interpreted as: the number of “call-in-sick” is significantly lower in the exercise group than the group members who do not meet the exercise guidelines. This leads to a rejection of the null hypothesis.

Table 9

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6.044[a]	2	.049	.025		
Likelihood Ratio	6.333	2	.042	.058		
Fisher's Exact Test	5.634			.025		
Linear-by-Linear Association	5.734[b]	1	.017	.021	.021	.019
N of Valid Cases	47					

4 cells (66.7%) have expected count less than 5. The minimum expected count is .38. The standardized statistic is 2.395.

Table 10

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.359			.049	.025
	Cramer's V	.359			.049	.025
Interval by Interval	Pearson's R	.353	.113	2.531	.015[c]	.021
Ordinal by Ordinal	Spearman Correlation	.357	.128	2.562	.014[c]	.021
N of Valid Cases		47				

Not assuming the null hypothesis. Using the asymptotic standard error assuming the null hypothesis. Based on normal approximation.

Question 9

The null hypothesis states that consistent exercise does not have a positive correlation with annual number of vacation days. A chi-square test indicated *no significant* correlation between question 11 and question 9. Moreover, there were too many cells that have an expected count less than 5; therefore, Fisher's Exact Test must be used in this case. However, the result (p >.05) of the test still shows that there was *no significant* correlation. Due to all variables being nominal data in the data set, Cramer's V test will be used.

From the Cramer's V the correlation coefficients whose magnitude are less than 0.3 (r=.266, p=.577) have *little or no correlation***.** This leads to retention of the null hypothesis.

Table 11

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6.629[a]	8	.577	.612		
Likelihood Ratio	8.681	8	.370	.522		
Fisher's Exact Test	6.036			.661		
Linear-by-Linear Association	1.937[b]	1	.164	.173	.093	.020
N of Valid Cases	47					

13 cells (86.7%) have expected count less than 5. The minimum expected count is .89. The standardized statistic is 1.392.

Table 12

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.376			.577	.612
	Cramer's V	.266			.577	.612
Interval by Interval	Pearson's R	.205	.144	1.406	.166[c]	.173
Ordinal by Ordinal	Spearman Correlation	.202	.146	1.383	.174[c]	.173
N of Valid Cases		47				

Not assuming the null hypothesis. Using the asymptotic standard error assuming the null hypothesis. Based on normal approximation.

Question 10

The null hypothesis states that consistent exercise does not have a positive correlation with planned medical days used. A chi-square test indicated *no significant* correlation between question 11 and question 10. Moreover, there were too many cells that have an expected count which is less than 5; therefore, Fisher's Exact Test must be used in this case. However, the result ($p > .05$) of the test shows that there was still *no significant* correlation. Due to every variable being nominal data in the data set, Cramer's V test should be used.

From the Cramer's V, the correlation coefficients whose magnitude are between 0.3 and 0.5 (r=.375, p=.151) indicate variables that have a *low correlation***.** This leads to retention of the null hypothesis.

Table 13

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	26.474[a]	20	.151	.132		
Likelihood Ratio	25.328	20	.189	.077		
Fisher's Exact Test	22.741			.060		
Linear-by-Linear Association	.075[b]	1	.785	.791	.404	.010
N of Valid Cases	47					

26 cells (86.7%) have expected count less than 5. The minimum expected count is .13. The standardized statistic is -.273.

Table 14

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.751			.151	.132
	Cramer's V	.375			.151	.132
Interval by Interval	Pearson's R	-.040	.110	-.271	.788[c]	.791
Ordinal by Ordinal	Spearman Correlation	-.004	.130	-.028	.978[c]	.978
N of Valid Cases		47				

Not assuming the null hypothesis. Using the asymptotic standard error assuming the null hypothesis. Based on normal approximation.

Sampling

One weakness of this study is a relatively small sample size. While there were enough participants to accurately determine strength of correlation between variables, much more detailed information could be gathered from a larger sample size. As mentioned earlier, convenience sampling was used. This sampling is an additional benefit because subjects are conveniently chosen due to their ease of accessibility at the stated setting. For a Pearson's Correlational Coefficient, a large sample size is not mandatory, but the significance will be important to accurately determine.

Discussion of the Data

After full analysis of each question, only one question proved to be significant. Question 8 (annual number of sick-call-ins) showed a significant correlation between the exercise group and decrease in the amount of call-ins. Therefore, this can be interpreted as: the number of “call-in-sick” is significantly lower in the exercise group, than the group who does not meet the exercise guidelines. While this is an important piece of information, there is still so much to be gained from a future study. The data shows at least one correlation between exercise and productivity. The level of significance is strong enough to warrant future studies on this very topic. A weakness of the survey lies in question 6 and 7, which allows the participants to enter free text into an answer box. The choices for those questions should have been formatted consistently with the other survey questions, allowing for check boxes with pre-filled responses. This would have given the data more strength when matching that question with another variable. Above all, this survey has made a significant correlation between exercise and work productivity among anesthesia providers, and it could be built upon in the future for more dynamic research.

CHAPTER V

SUMMARY

Significance and Implications for Practice

The goal of this capstone is to test the correlation between exercise and work productivity. This research was able to find a positive correlation between those two variables. However, there are weaknesses in the research that could be addressed and corrected in future studies. A more robust pilot study could be done to gather specific results across a larger sample size. This information can be used to build on previous research and can lead to more development in the future focusing on exercise and its relation to increased work production among anesthesia providers.

There are a few suggestions for future research that should be shared. Researching individual anesthesia groups or departments may be more effective than sending a broad survey to a large population. By focusing on a specific group and then comparing them with other groups any differentiating variables present at each facility may be eliminated. This could include patient acuity, difference in schedules, workplace hostility and environment, location, caseload, and different types of procedures. Also, creating age groups would be effective in determining the effects of exercise. Overall, creating more specific questions would lead to more discriminated data, which would build a more robust research project with higher-level statistics.

The implications of further research could be vast. Multiple areas of education and research could be included for greater results. Many different

education departments at The University of Southern Mississippi could be used to enhance a project of this kind. The Kinesiology Department, the Education/Research Department, Statistics Department, and Health Science/Behavior Department could all become involved in strengthening this type of study. Once more research is done, it could be incorporated with patient safety, incident reports, outcomes measures, and measures of productivity among anesthesia providers to directly measure the effects of consistent exercise. In the future, this research could lead to increased patient safety, increased productivity, higher morale, increased retention, and lowered costs for anesthesia groups and departments.

Conclusion

From reviewing current literature, to testing hypotheses, to analyzing data, the results of this research proves a meaningful relationship between consistent exercise and work productivity. However, there are weaknesses in this study that can be corrected and improved, which shows the need for future research. This capstone will be published by The University of Southern Mississippi and presented to key stakeholders, including American Association of Nurse Anesthetists and Mississippi Association of Nurse Anesthetists. Advanced Practice Registered Nurses must continue to research, evaluate studies, and implement their findings to improve the ever-changing environment of healthcare today.

APPENDIX A

IRB APPROVAL LETTER

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional.review.board

NOTICE OF COMMITTEE ACTION
The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the “Adverse Effect Report Form”.
- If approved, the maximum period of approval is limited to twelve months.

Projects that exceed this period must submit an application for renewal or continuation.
PROTOCOL NUMBER: 15091602
PROJECT TITLE: The Effects of Consistent Exercise on Work Productivity Among Anesthesia Providers
PROJECT TYPE: New Project
RESEARCHER(S): Samuel Keller Self
COLLEGE/DIVISION: College of Nursing
DEPARTMENT: Advanced Practice Nursing-Nurse Anesthesia
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Expedited Review Approval
PERIOD OF APPROVAL: 09/17/2015 to 09/16/2016
Lawrence A. Hosman, Ph.D.
Institutional Review Board

APPENDIX B

CAPSTONE SURVEY

Q1 Anonymous and confidential data will be gathered through Qualtrics. Data will be coded and stored using Microsoft Excel on a personal computer under 2 password protections. Data will be analyzed using the program SPSS to perform a statistical analysis. Data will be destroyed on May 31, 2016. De-identified aggregate data is likely to be used in the future but no participant will be identifiable in any way. Participation is completely voluntary. Questions regarding the research should be directed to the Principal Investigator, Sam Self (samuel.self@eagles.usm.edu) or Program Director, Dr. Vickie Stuart (vickie.stuart@usm.edu). This project has been approved by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601)266-5997.

Q2 Are you a CRNA or Anesthesiologist who has worked an average of 40 hours or more per week in the last year?

- ❍ Yes (1)
- ❍ No (2)

Q3 Are you between the ages of 18 and 70?

- ❍ Yes (1)
- ❍ No (2)

Q4 Are you Male or Female?

- ❍ Male (1)
- ❍ Female (2)

Q5 Do you take call?

- ❍ Yes (1)
- ❍ No (2)

Q6 How many hours is your average workday?

❍ Please fill in the blank (1) _____

Q7 On average, in how many cases have you been the primary provider over the last year?

❍ Please fill in the blank (1) _____

Q8 How many times have you "called-in-sick" (within 24 hours of your scheduled shift) in the last year?

❑ 0 (11)
❑ 1 (1)
❑ 2 (2)
❑ 3 (3)
❑ 4 (4)
❑ 5 (5)
❑ 6 (6)
❑ 7 (7)
❑ 8 (8)
❑ 9 (9)
❑ 10 or more (10)

Q9 How many planned vacation days did you use in the last year?

❍ 0-5 days (1)
❍ 6-10 days (2)
❍ 11-15 days (3)
❍ 16-20 days (4)
❍ 21-25 days (5)
❍ 26-30 days (6)
❍ 31-35 days (7)
❍ 36 or more days (8)

Q10 How many planned "medical leave" days did you use in the last year?

- ❍ 0 (11)
- ❍ 1 (1)
- ❍ 2 (2)
- ❍ 3 (3)
- ❍ 4 (4)
- ❍ 5 (5)
- ❍ 6 (6)
- ❍ 7 (7)
- ❍ 8 (8)
- ❍ 9 (9)
- ❍ 10 or more (10)

Q11 American Heart Association Exercise Guidelines: (please check the box that you routinely complete on a weekly basis)

- ❍ At least 30 minutes of moderate-intensity aerobic activity at least 5 days per week for a total of 150 minutes. (MODERATE-INTENSITY = Walking briskly, water aerobics, bicycling slower than 10 miles per hour, doubles tennis, ballroom dancing, general gardening) (1)
- ❍ At least 25 minutes of vigorous aerobic activity at least 3 days per week for a total of 75 minutes. (VIGOROUS-INTENSITY = race walking, jogging, running, swimming laps, singles tennis, aerobic dancing, bicycling 10 miles per hour or faster, jumping rope, heavy gardening, hiking uphill or with heavy backpack) (2)
- ❍ A combination of moderate-intensity and vigorous-intensity aerobic activity and moderate- to high-intensity muscle-strengthening activity at least 2 days per week (3)
- ❍ An average 40 minutes of moderate- to vigorous-intensity aerobic activity 3 or 4 times per week (4)
- ❍ I exercise, but not enough to meet these criteria (5)
- ❍ I don’t exercise (6)

APPENDIX C

SURVEY RESULTS

Initial Report

Last Modified: 09/15/2015

1. Are you a CRNA or Anesthesiologist who has worked an average of 40 hours or more per week in the last year?

#	Answer		Response	%
1	Yes		47	94%
2	No		3	6%
	Total		50	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.06
Variance	0.06
Standard Deviation	0.24
Total Responses	50

2. Are you between the ages of 18 and 70?

#	Answer		Response	%
1	Yes		51	100%
2	No		0	0%
	Total		51	100%

Statistic	Value
Min Value	1
Max Value	1
Mean	1.00
Variance	0.00
Standard Deviation	0.00
Total Responses	51

3. Are you Male or Female?

#	Answer		Response	%
1	Male		30	59%
2	Female		21	41%
	Total		51	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.41
Variance	0.25
Standard Deviation	0.50
Total Responses	51

4. Do you take call?

#	Answer		Response	%
1	Yes		34	68%
2	No		16	32%
	Total		50	100%

Statistic	Value
Min Value	1
Max Value	2
Mean	1.32
Variance	0.22
Standard Deviation	0.47
Total Responses	50

5. How many hours is your average workday?

#	Answer		Response	%
1	Please fill in the blank		51	100%
	Total		51	100%

Please fill in the blank
9, 10, 12, 12, 40778, 9, 13, 10, 10, 8, 10, 9, 8, 10, 13, 9, 9 hours, 16, 8.5, 8, 45, 8 hours, 7 hours, 10, 10, 6, 8, 10, 13, 8-10, 50, seven, 40, 6, 8, 9, 50, 7, 9 hours, 8, 8, 40, 8, 10, 39, 6, 40,

10, 10, 50, 13

Statistic	Value
Min Value	1
Max Value	1
Mean	1.00
Variance	0.00
Standard Deviation	0.00
Total Responses	51

6. On average, in how many cases have you been the primary provider over the last year?

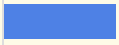
#	Answer		Response	%
1	Please fill in the blank		48	100%
	Total		48	100%

Please fill in the blank

100, 850, 300, 800, 780, 800, 500, 400, 900, 800, 690, 650, 250, 200, 600, 700, 700, 1250, 800, 1200, 1100, 500, 1200, 700, 900, >30, 1200, 1000, 850, 600, 1000, 1000, 266, 360, 500, 800, 150, 90%, 800, 200, 700, 150, 1700, 1000, 450, 0, 350, 800

Statistic	Value
Min Value	1
Max Value	1
Mean	1.00
Variance	0.00
Standard Deviation	0.00
Total Responses	48

7. How many times have you "called-in-sick" (within 24 hours of your scheduled shift) in the last year?

#	Answer		Response	%
1	1		12	24%
2	2		7	14%
3	3		1	2%
4	4		0	0%

5	5		0	0%
6	6		0	0%
7	7		1	2%
8	8		0	0%
9	9		0	0%
10	10 or more		0	0%
11	0		32	63%

Statistic	Value
Min Value	1
Max Value	11
Total Responses	51

8. How many planned vacation days did you use in the last year?

#	Answer		Response	%
1	0-5 days		6	12%
2	6-10 days		13	25%
3	11-15 days		10	20%
4	16-20 days		4	8%
5	21-25 days		8	16%
6	26-30 days		3	6%
7	31-35 days		4	8%
8	36 or more days		3	6%
	Total		51	100%

Statistic	Value
Min Value	1
Max Value	8
Mean	3.69
Variance	4.30
Standard Deviation	2.07
Total Responses	51

9. How many planned "medical leave" days did you use in the last year?

#	Answer		Response	%
1	1		4	8%
2	2		2	4%
3	3		2	4%
4	4		0	0%
5	5		1	2%
6	6		0	0%
7	7		0	0%
8	8		0	0%
9	9		0	0%
10	10 or more		2	4%
11	0		40	78%
	Total		51	100%

Statistic	Value
Min Value	1
Max Value	11
Mean	9.39
Variance	11.92
Standard Deviation	3.45
Total Responses	51

10. American Heart Association Exercise Guidelines: (please check the box that you routinely complete on a weekly basis)

#	Answer		Response	%
1	At least 30 minutes of moderate-intensity aerobic activity at least 5 days per week for a total of 150 minutes. (MODERATE-INTENSITY = Walking briskly, water aerobics, bicycling slower than 10 miles per hour, doubles tennis, ballroom dancing, general gardening)		7	14%
2	At least 25 minutes of vigorous aerobic activity at least 3 days per week for a total of 75 minutes. (VIGOROUS-INTENSITY = race walking, jogging, running, swimming laps, singles tennis, aerobic dancing, bicycling 10		11	22%

	miles per hour or faster, jumping rope, heavy gardening, hiking uphill or with heavy backpack)			
3	A combination of moderate-intensity and vigorous-intensity aerobic activity and moderate- to high-intensity muscle-strengthening activity at least 2 days per week		6	12%
4	An average 40 minutes of moderate- to vigorous-intensity aerobic activity 3 or 4 times per week		7	14%
5	I exercise, but not enough to meet these criteria		14	27%
6	I don't exercise		6	12%
	Total		51	100%

Statistic	Value
Min Value	1
Max Value	6
Mean	3.55
Variance	2.81
Standard Deviation	1.68
Total Responses	51

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